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Two new species of *Terriera* from Yunnan Province, China

Juan-fang Song, Ling Liu, Yuan-yuan Li & Cheng-Lin Hou*

College of Life Science, Capital Normal University, Xisanhuanbeilu 105, Haidian, Beijing 100048, China

* Correspondence to: *houchenglincn@yahoo.com*

Abstract —Two new species of *Terriera* are described and illustrated from Yunnan Province, China. *Terriera rotundata* on leaves of *Quercus* sp. is recognized by its more or less circular ascomata in vertical section. *Terriera petrakii* on *Smilax bracteata* is similar to *Lophodermium camelliicola* but differs from the latter by the pale conidiomata and ellipsoidal conidia and the well-developed textura prismatica between the covering and the basal stroma.

Key words —*Ascomycota*, *Rhytismatales*, *Fagaceae, Smilacaceae*

Introduction

The genus *Terriera* B. Erikss. was first segregated from *Lophodermium* Chevall. based mainly on paraphyses swollen at the tip to form an epithecium and the lack of lip cells (Eriksson 1970). Johnston (1988, under *L. multimatricum*; 1989, under *L. minus*) considered ascomatal development and structure as important features for *Terriera*. Molecular analyses support *Terriera* as monophyletic (Ortiz-García et al. 2003, Lantz et al. 2011). Many *Lophodermium* species with ascomatal structures typical of *Terriera* have been transferred to *Terriera* (Johnston 2001, Ortiz-García et al. 2003). Of the 18 species recognized worldwide, only two species have been reported for China (Fröhlich & Hyde 2000, Yang et al. 2011). We describe here two new species of *Terriera* from Yunnan Province, China.

Materials & methods

Hand sections of different thickness of ascomata were prepared using a razor blade and mounted in water, Melzer's reagent, 5% KOH, or 0.1% (w/v) cotton blue in lactic acid. For the observation of ascomatal outlines in vertical section, sections were pretreated in water before being mounted in lactic acid or cotton blue. Gelatinous sheaths surrounding ascospores and paraphyses were observed in water or cotton blue. Ascospore contents were drawn based on observations in water mounts. Measurements

were taken of 20 ascospores and asci for each specimen from tissues mounted in 5% KOH or Melzer's reagent.

Taxonomy

Terriera rotundata C.L. Hou, **sp. nov.** Figs. 1–5

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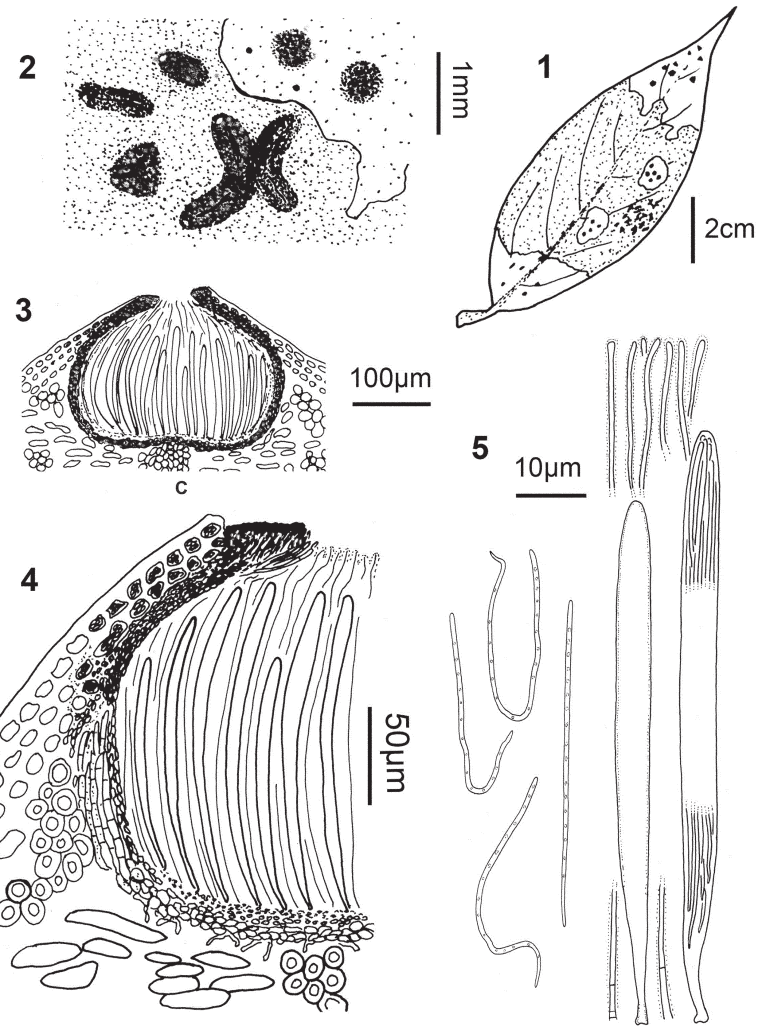
T. rotundata differs from the known species in *Terriera* by its more or less globular ascomata in vertical section.

Type: China. Yunnan, Chuxiong, Zixishan, alt. ca. 2400 m, on fallen leaves of *Quercus* sp. (*Fagaceae*). 2 August 2001, C.-L. Hou et al. 172 (**Holotype** BJTC 201102).

Etymology: *rotundata* refers to the almost rounded shape of the ascoma as seen in vertical section.

Ascomata developing on fallen leaves, epiphyllous, occasionally hypophyllous, not associated with bleached, pale brown areas. Ascomata (450–)600–900 × 330–450 µm, elliptical but often strongly curved at maturity, occasionally triangular, young ascomata more or less elliptical in outline, black, shiny, with a blurred margin, both ends rounded and often with pale spots, the central part of the ascomata strongly raising above the surface of the substrate, opening by a longitudinal split or occasionally by teeth. Immature, unopened ascomata macroscopically visible as two black areas separated from each other by a broad, pale longitudinal zone. In median vertical section, ascomata 140–180 µm deep in the host tissue, more or less circular in section. Covering stroma consistently 28–35 µm thick, composed of an outer layer of host cuticle, epidermal and hypodermal cells filled with dark brown, thick-walled fungal cells 2–3 µm diam., and an inner layer formed by 3–4 rows of hyaline, thin-walled, angular cells. Horizontal portion of the covering stroma 20–30 µm long, 10–25 µm thick, composed of periphysoids arising from the inner part of the covering stroma, their tips forming a hard black crust. A triangular space in section between the covering stroma and the basal stroma is filled with vertically arranged rows of prismatic, hyaline to slightly brown, thin-walled cells 6–9 × 3–5 µm. Basal stroma medium to well-developed, ± flat, composed of brown to dark brown textura globulosa-angularis, 15–20 µm thick. Excipulum and Lip cells absent. Subhymenium 6–10 µm thick, composed of small cells 2–3 µm diam. Paraphyses 120–140 × 1 µm, filiform, septate or aseptate, unbranched, slightly swollen at the apex, embedded in gelatinous sheaths. Asci ripening sequentially, 90–120 × 4–5.5 µm, narrow-cylindrical, thin-walled, J^-, without circumapical thickening, discharging spores through a small apical hole, 8-spored. Ascospores fasciculate, 70–90(–95) × 0.8–1 µm, filiform, hyaline, aseptate, with numerous guttules, gelatinous sheaths not seen. Liberated ascospore often strongly bent.



Figs 1–5. *Terriera rotundata* on leaves of *Quercus* sp. 1. A leaf bearing ascomata. 2. Ascomata observed under the dissecting microscope (top right corner, two immature ascomata of *Coccomyces* sp. 3. Ascoma in vertical section. 4. Structure of an ascoma in vertical section. 5. Paraphyses, an ascus after the liberation of the ascospores, a mature ascus with ascospores, and discharged ascospores.

Zone lines only present between colonies of this and taxonomically distinct species.

Conidiomata not observed.

Comments — *Terriera rotundata* is distinctive within the genus because of its more or less globular ascomata in vertical section. The developmental pattern in *T. rotundata* is similar to that of *T. minor* (Tehon) P.R. Johnst. in vertical section with the textura prismatica between covering and basal stroma composed of vertically oriented cells (Johnston 1988, 1989, 2001). However, the shelf-like ridge along ascomatal opening typical of *Terriera* is poorly developed in *T. rotundata*. In addition, liberated ascospores of *T. rotundata* are often strongly bent and lack gelatinous sheaths.

Terriera petrakii C.L. Hou, **sp. nov.** Figs. 7–13

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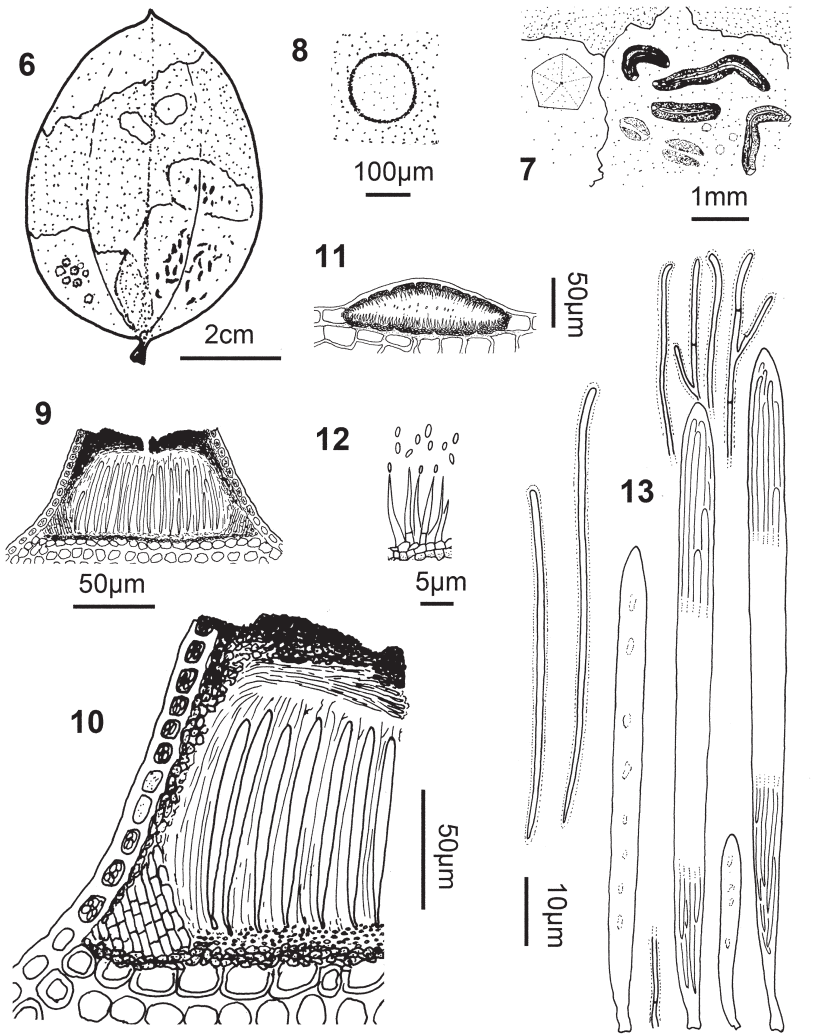
T. petrakii is similar to *T. minor* but differs by conidiomata and conidia.

Type: China, Yunnan, Chuxiong, Zixishan, alt. ca. 2400 m, on fallen leaves of *Smilax bracteata* Presl (*Smilacaceae*), 2 August 2001, C.-L. Hou et al. 170 (**Holotype**, BJTC 201103).

Etymology: In honour of Franz Petrak, a well-known mycologist who studied a similar but undescribed species, "*Lophodermium smilacinum*" Petr.

Ascomata developing on leaves, epiphyllous, occasionally hypophyllous, in slightly bleached pale brown areas, associated with thin, black zone lines. Ascomata (600–)800–1300 × 380–450 μm, elongate-elliptical, often strongly curved or triangular, often coalesced, black in the central part, margin blurred, shiny, both ends often with pale spots, the central part of the ascomata strongly raising above the surface of the substrate, forming an elongate, flat zone at the opening, lips absent, opening by a longitudinal split. Immature, unopened ascomata macroscopically appearing as two black areas separated by a broad, pale longitudinal zone, young ascomata more or less elliptical in outline. In median vertical section, ascomata subepidermal, 120–150 μm deep, ± trapezoid in section. Covering stroma 23–30 μm thick over its entire extent, consisting of an outer layer of host epidermal cells filled with dark brown, angular fungal cells, a layer of dark brown textura angularis of different thickness and an inner layer of hyaline, angular cells, horizontal portion of the covering stroma 80–100 μm long and 15–25 μm thick, composed of black textura angularis with cells 4–6 μm diam. The triangular zone in section between the covering stroma and the basal stroma composed of thin-walled, cylindrical cells arranged in vertical rows. Basal stroma, medium to well-developed, ± flat, composed of brown to dark brown textura globulosa-angularis, 10–15 μm thick. Excipulum present, formed by paraphysis-like cells 1–2 μm diam., thickened near the



Figs 1–7. *Terriera petrakii* on leaves of *Smilax bracteata*. 6. A leaf bearing ascomata, conidiomata and zone lines. 7. Ascomata observed under the dissecting microscope (right, an ascoma of *Coccomyces occultus*). 8. A conidioma observed under the dissecting microscope 9. Ascoma in vertical section. 10. Structure of an ascoma in vertical section. 11. Structure of a conidioma in vertical section. 12. Conidiogenous cells and conidia. 13. Paraphyses, a young ascus, two mature asci with ascospores, and discharged ascospores.

opening, embedded in a gelatinous matrix. Subhymenium consisting of textura angularis with cells 2–4 µm diam., 6–10 µm thick. Paraphyses 100–125 × 1 µm, filiform, septate, branched, or unbranched, not swollen at the apex. Asci ripening sequentially, 85–110 × 4–5 µm, cylindrical, thin-walled, J–, without circumapical thickening, discharging spores through a small apical hole, 8-spored. Ascospores fasciculate, (60–)70–85 × 0.8 µm, filiform, hyaline, aseptate, with a thin gelatinous sheath.

Conidiomata in pale brown areas near the ascomata, round, pale, with conspicuous black perimeter line, 140–300 µm diam., opening by ostioles. In vertical section, conidiomata intraepidermal, 40–55 µm deep. Upper layer composed of host cuticle, remains of host epidermal cells, and hyaline textura angularis with cells 3–5 µm diam. Basal layer 50–58 µm thick, composed of light brown textura angularis. Conidiogenous cells ovoid-cylindrical, 9–13 × 1.5–2 µm tapering towards the apex, hyaline. Conidia broadly ellipsoidal, hyaline, 1.5–2 × 1 µm.

Additional specimen examined —**United States**, **Hawaii:** Olinda Pipe Line, on fallen twigs of *Smilax* sp., coll. C.L. Shear & N.E. Stevens, det. F. Petrak, 29 December 1928 (W 618).

Comments — The ascomatal structure of *Terriera petrakii* is very similar to that of *T. minor,* which differs in shorter, uncurved ascomata, broader 0–1-septate ascospores, a less well developed excipulum, and an unknown anamorph. The conidioma shape and structure and ascospore shape in *T. petrakii* are very similar to those of *Lophodermium camelliicola* Minter (which should be transferred to *Terriera*). That species differs in producing black instead of pale conidiomata, cylindrical to ellipsoidal conidia, a less developed textura prismatica between the covering and basal stroma, and its habit on *Camellia sinensis* (L.) Kuntze. The herbarium specimen W 618 (labelled by Petrak as "*Lophodermium smilacinum* Petr. n. sp.", but never described), with a structure typical of *Terriera*, is somewhat similar to *T. petrakii* but occurs on twigs, has narrower and more confluent ascomata, and lacks an anamorph.

Ascomata of *Terriera petrakii* often occur together with *Hypoderma smilacicola* C.L. Hou & M. Piepenbr. and *Coccomyces occultus* Y.L. Lin & Z.Z. Li (Hou & Piepenbring 2006, Lin et al. 1999).

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Literature cited

Eriksson B. 1970. On Ascomycetes on *Diapensales* and *Ericales* in Fennoscandia. Symb. Bot. Upsal. 19: 1–71.

Fröhlich J, Hyde KD. 2000. Palm microfungi. Fungal Diversity Press. Hong Kong. 364 p.

Hou CL, Piepenbring M. 2006. Five new species of *Hypoderma* with a key to *Hypoderma* species for China. Nova Hedwigia 82: 91–104. http://dx.doi.org/10.1127/0029-5035/2006/0082-0091

Johnston PR. 1988. An undescribed pattern of ascocarp development in some non-coniferous *Lophodermium* species. Mycotaxon 31: 383–394.

Johnston PR. 1989. *Lophodermium* (*Rhytismataceae*) on *Clusia*. Sydowia 41: 170–179.

Johnston PR. 2001. Monograph of the monocotyledon-inhabiting species of *Lophodermium*. Mycol. Pap. 176: 1–239.

Lantz H, Johnston PR, Park D, Minter DW. 2011. Molecular phylogeny reveals a core clade of *Rhytismatales*. Mycologia 103: 57–74. http://dx.doi.org/10.3852/10-060

Lin YR, Li ZZ, Chen Y, Li Z, Wu WJ. 1999. A new species of *Rhytismatales*, *Coccomyces occultus* sp. nov. J. Anhui Agricult. Univer. 26: 37–39.

Ortiz-García S, Gernandt DS, Stone JK, Johnston PR, Chapela IH, Salas-Lizana R, Alvarez-Buylla ER 2003. Phylogenetics of *Lophodermium* from pines. Mycologia 95:846–859. http://dx.doi.org/10.2307/3762013.

Yang ZZ, Lin YR, Hou CL. 2011. A new species of *Terriera* (*Rhytismatales, Ascomycota*) from China. Mycotaxon 117: 367–371. http://dx.doi.org/10.5248/117.367